

# The Road to Cloud Standards via a Reference Architecture

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# Background

- Technological Maturity
- Economic
- Standards Driven
  - Data Portability
  - Service Interoperability
  - Security
  - Cloud to Cloud interaction
- USG needs a starting point – ***A Reference***

# Objective

Develop a vendor neutral reference architecture consistent with the NIST Cloud Computing definition



## 3 Service Models

- SaaS, PaaS, IaaS



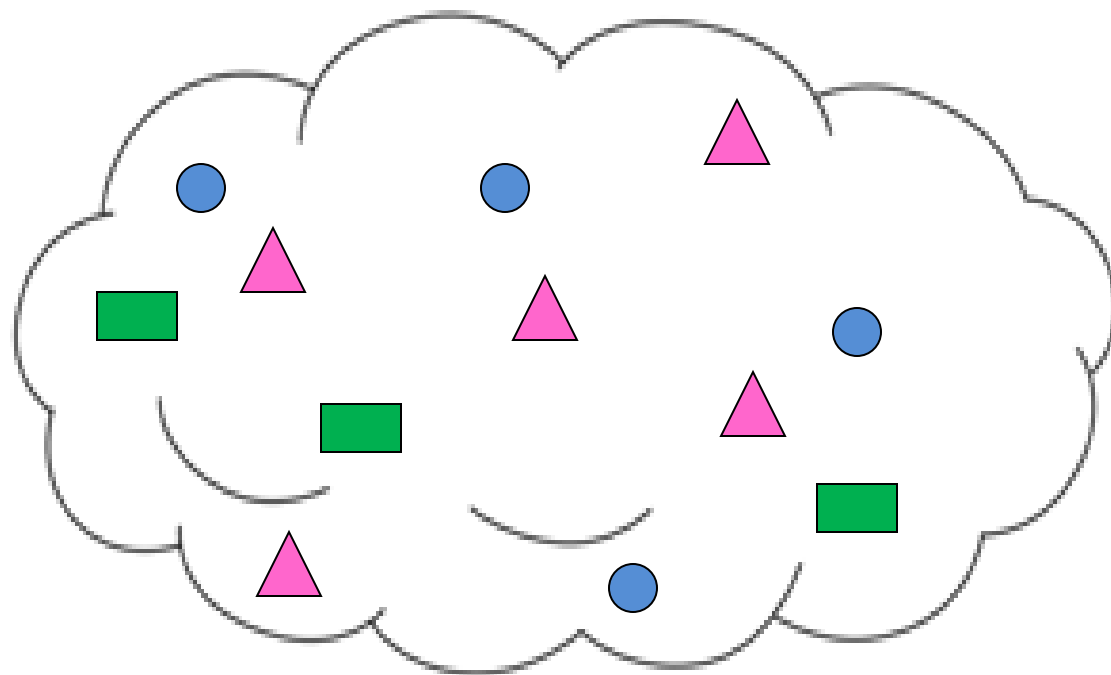
## 4 Deployment models

- Public, Private, Community, Hybrid



## 5 Essential Characteristics

On demand self-service  
Broad network access  
Resource Pooling  
Rapid Elasticity  
Measured Service



## A Cloud

*Determine the “What” of Cloud Computing, not the “How”*

# NIST Cloud Computing Reference Architecture

## Actors and their Roles

### Cloud Consumer

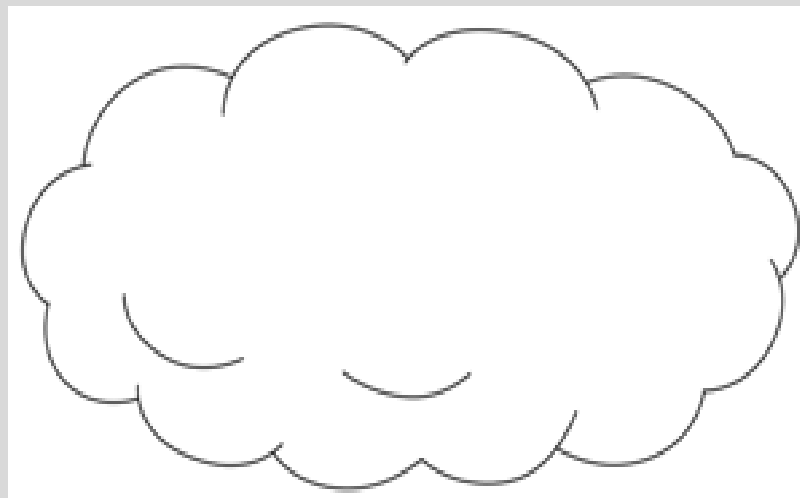
Person or organization that maintains a business relationship with, and uses service from *Cloud Providers*.

### Cloud Auditor

A party that can conduct independent assessment of cloud services, information system operations, performance and security of the cloud implementation.

### Cloud Provider

Person, organization or entity responsible for making a service available to *Cloud Consumers*.



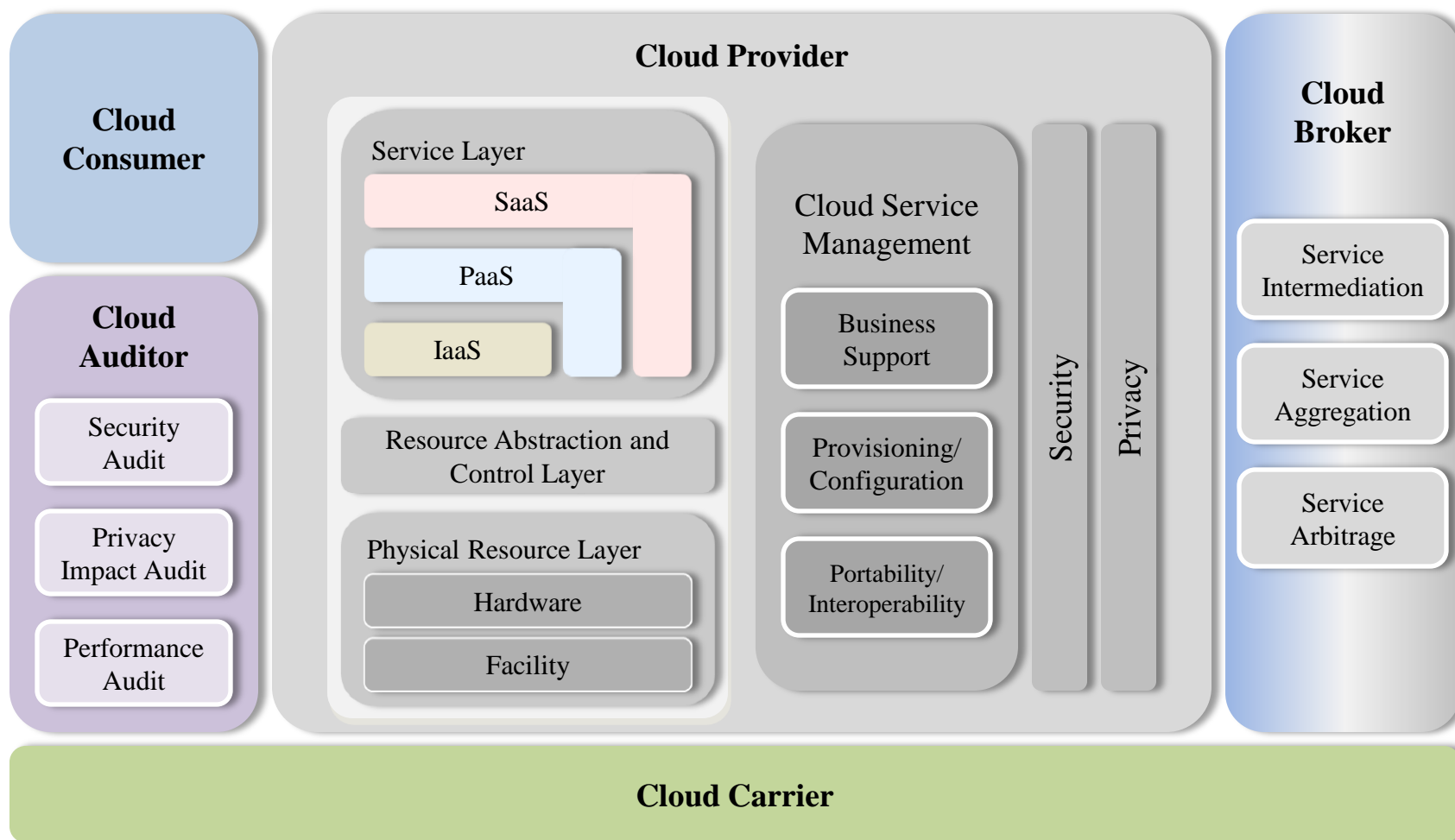
### Cloud Broker

An entity that manages the use, performance and delivery of cloud services, and negotiates relationships between *Cloud Providers* and *Cloud Consumers*.

### Cloud Carrier

The intermediary that provides connectivity and transport of cloud services from *Cloud Providers* to *Cloud Consumers*.

# The NIST Cloud Computing Reference Architecture



# Taxonomies

*Taxonomy: The science of categorization, or classification, of things based on a predetermined system. (Webopedia)*

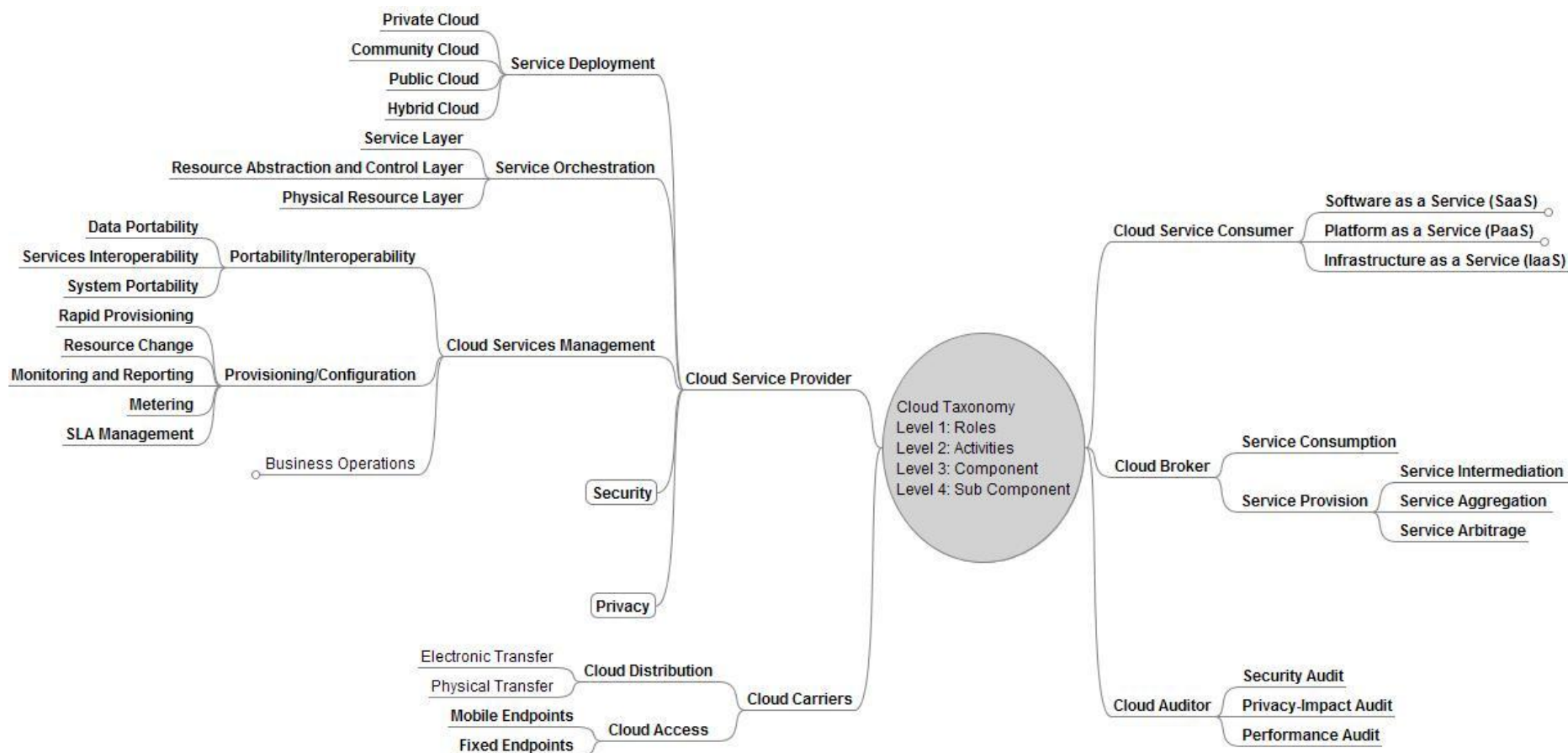
## Main Attributes:

- Typically a controlled vocabulary with a hierarchical tree-like structure
- Terms in a taxonomy have relationships with other terms
- Usually in the form of a parent (broader) / child (narrower)

## Benefits:

- Encompasses and labels all significant concepts within a given domain
- Allows users to understand the context of each label

# RA Taxonomy



# Examples Terms and Definitions

## Level 1:

- **Cloud Service Provider** – Person, organization or higher-level system responsible for making a *service* available to *service consumers*.

## Level 2:

- **Cloud Service Management** – Cloud Service Management includes all the service-related functions that are necessary for the management and operations of those services required by or proposed to customers.

## Level 3:

- **Public Cloud** - The cloud infrastructure is made available to the general public or a large industry group and is owned by an organization selling cloud services. [NIST Definition of Cloud Computing]

## Level 4:

- **Data Portability** – The ability to transfer data from one system to another without being required to recreate or reenter data descriptions or to modify significantly the application being transported. [Federal Standard 1037C]



# Next Steps

- Version 2.0 of NIST Cloud Computing Reference Architecture
  - Includes a more detailed description of security and privacy.
  - Maps USG Target BUC to RA
  - Deep Dive into NIST Service Models
  - Cloud Data Issues
- Version 2.0 of NIST Cloud Computing Taxonomy which includes
  - Security & Privacy
  - Updated SaaS taxonomy to reflect USG Business Use Cases.
  - Newly identified additional taxonomies to support USG Business Use Case

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# Questions?

NIST Cloud Computing Collaboration Site

<http://collaborate.nist.gov/twiki-cloud-computing/>

NIST Cloud Computing Home Page

<http://www.nist.gov/itl/cloud>

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